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Early Retirement in Portugal

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Abstract

This paper analyzes the early retirement decisions made by Portuguese workers aged 50 to 64. It investigates the main characteristics of early retirees, and the main determinants of their decision, based on the eight waves of the European Community Household Panel for Portugal, from 1994 to 2001. Several definitions of early retirement are considered in order to take into account the different pathways to retirement that workers may follow.

Some results are robust to different methodologies: an older age, health problems, a spouse that is not working, and small family sizes generally increase the chances of early retirement.

1. Introduction

As the pressure exerted on the sustainability of social security systems increases, many countries have begun to reform their pension systems and are adopting measures to improve the financial prospects of social security. Among such measures, we find increases in the legal retirement age, changes in the parameters affecting the value of pensions and a number of arrangements designed either to limit early retirement or subject it to financial penalty. In fact, taking into

account the rise in life expectancy, measures that seek to increase the length of the contribution period and reduce the period during which individuals benefit from the system are increasingly seen as essential to ensure sustainability. At the same time, the European Union has identified the need to attract and maintain more people in employment as one of the integrated guidelines for growth.

For these reasons, the retirement decision and particularly the determinants of early retirement are an opportune topic of research, having already attracted widespread academic attention.

We can identify different lines of research in the existing literature, using their main focus as the identifying criterion. A large amount of earlier work was mostly concerned with two important determinants of the retirement decision: financial incentives (Pellechio 1979, Gruber and Wise 1997, Blöndal and Scarpetta 1999, Hakola 2000, Hakola and Ilmakunnas 2000, Compton 2001, Hernoes et al 2000, Euwals et al 2006) and health (Sickles and Taubman 1986, Linsenmeier 2002, Larsen and Gupta 2004, Green 2006, Miah and Wilcox-Gök 2007). There has also been a search to discover the more important of the two determinants (Quinn 1977, Bazzoli 1985, Anderson and Burkhauser 1985, McGarry 2002).

Later, researchers turned to analyzing the retirement decision at the household level. Couples may coordinate their decisions. Mastrogiacomo et al (2002), for instance, view retirement as the result of a cooperative bargaining process. They use the lifetime budget constraint approach and apply it to the household instead of the individual. The type of household, the employment status of the partner or other characteristics of the partner may influence the choice of leaving the labor market (Gustman and Steinmeier 2000, 2002, Mastrogiacomo et al 2002, Coile 2004, Blau 1998, Jia 2004, Jiménez-Martín et al 1999).

Some studies have focused on the existence of different channels of exit from the labor market and entry into early retirement: unemployment benefits, disability pensions and pure early retirement routes are the most important (Blöndal and Scarpetta 1999, Hakola 2000, Hakola and Ilmakunnas 2000, Larsen and Pedersen 2008, Blanco 2000, Dahl et al 2003, Schils 2001, Hytti 2004). Some of the channels may be identified with involuntary early retirement: the first two arguably contain a predominantly unintentional outcome.

Some authors have introduced other determinants into the analysis of early retirement, such as occupational characteristics (Quinn 1977, Hayward and Hardy 1985, Hayward 1986, Filer and Petri 1988), and the unemployment rate (Blöndal and Scarpetta 1999, Hutchens 1999, Hakola and Uusitalo 2002, Dorn and Sousa-Poza 2005a, Dahl et al 2003, Fischer and Souza-Poza 2006, Larsen and Pedersen 2008).¹

The most recent works tend to analyze the effect of a relatively long list of variables on the decision to retire. Examples of these are the empirical studies relating to the Netherlands (Schils 2001), Norway (Dahl et al 2003, Jia 2004), Switzerland (Dorn and Souza-Poza 2005a) and Denmark (Larsen and Pedersen 2008).

¹ The unemployment rate is seen as a determinant of early retirement from different perspectives. Blöndal and Scarpetta (1999) view it from a supply side perspective, claiming that it acts as a discouragement for the older unemployed, while Hutchens (1999), Hakola and Uusitalo (2002), and Dorn and Sousa-Poza (2005b) view unemployment benefits from a demand side perspective, seeing it as a subsidy to the firm's own cost of financing early retirement. Osberg (1993) argues that unemployment is a constraint on the labor supply and that this constraint is more severe for older workers.

Like many other European countries, Portugal has embarked on a major reform of its public old age pension system where changes in the retirement age and penalties for early retirement are among the measures undertaken. It therefore seems important to identify the determinants of early retirement and the variables that do not influence this behavior. Our study analyzes the early retirement decisions made by Portuguese workers between 1994 and 2001, using the European Community Household Panel (ECHP).

The paper is organized as follows. After describing the institutional framework for early retirement in Portugal during the period of analysis in section 2, the paper presents the data and the methodology in section 3, and examines the importance of several possible determinants in sections 4 and 5. Section 4 uses hazard rates, and section 5 estimates a multivariate probit model. Section 6 concludes.

2. Institutional Background

Portugal has a public social security system that is closely related to the Bismarckian model. In 1994, the system comprised three different subsystems according to their aim and their financing source: the insurance-based subsystem, the non-contributory subsystem and the social action subsystem (social services and establishments). In 2002, after the implementation of the Framework Law No. 32/2002, the system was composed of the insurance-based subsystem, the citizenship social protection subsystem, the family protection subsystem, and the social action subsystem. The system is run by the Ministry of Labor and Solidarity.

The central component of the system is the *insurance-based subsystem*, which covers all workers in the private sector (employees and self-employed) and is aimed at ensuring protection against a loss or reduction of earnings in the event of sickness, parentage (maternity, paternity and adoption), unemployment, occupational disease and employment injury, disability, old-age and death.² This subsystem comprises two schemes (a *general scheme*, which is by far the most important, and a *voluntary insurance scheme*) and provides earnings-related benefits. It is funded by social contributions from workers (11% of earnings), employers (23.75% of earnings) and self-employed (23-28% of reference income until 1998 and 25.4-32% thereafter) and operates on a PAYG basis.

Civil servants are covered by a special pension system supervised by the Ministry of Finance.³

This section briefly describes the three main programs existing under the insurance-based subsystem (old-age and disability pensions and unemployment benefits) which may correspond to exit routes from the labor market at an early age. Because of its specific rules, the public sector scheme is excluded from our empirical analysis.

Old age

Under the insurance-based subsystem, an earnings-related pension is provided for all insured persons with a minimum period of 15 years of insurance. The legal retirement age is 65 years for

² Protection in the event of an occupational disease is managed by a specific organization: the National Centre for the Protection of Occupational Risks. Insurance for occupational injuries is provided by insurance companies supervised by the Ministry of Finance.

³ Law No. 60/2005 established mechanisms for the convergence (between 2006 and 2015) of this special pension system and the insurance-based subsystem.

both men and women. Retirement age equality was gradually introduced between 1993 and January 1999. Before this decision, the retirement age was 62 years for women.

During the period 1994-2001, the amount of the old-age pension was calculated according to the following parameters: the number of years of insurance; the reference income (the average monthly wage of the best 10 of the last 15 years); and an annual accrual rate of 2%.⁴ The value of the statutory pension may be neither less than 30% of the reference income (minimum pension) nor greater than 80% of this reference income (maximum pension for a full career of 40 years).

Since 1999, early retirement has been possible for people of at least 55 years of age and with a minimum of 30 years of contributions. However, the value of the pension is reduced by 4.5% for each year of retirement taken in advance of the minimum legal requirement.⁵ However, when the insurance period is longer than 30 years, the number of years of retirement taken in advance of the minimum legal retirement age (together with the payment of a penalty) was reduced by one year for each group of 3 years beyond 30.

Disability

The insurance-based subsystem also provides a disability pension for insured people who, before reaching retirement age, meet two eligibility requirements: i) the loss of 2/3 of earning capacity;

⁴ A new pension formula was established in 2002 (Social Security Framework Law No. 32/2002).

⁵ In 2005 (Decree-Law No. 125/2005, of 3 August), the possibility of enjoying early access to retirement pension was suspended. The reform of 2007 established new measures designed to promote longer working careers.

and ii) five years of contributions, with a minimum of 120 days of registered earnings each year. The disability pension is calculated in the same way as old-age pension and is paid until retirement age.

It is important to note that all types of pensions have become subject to taxation since 1989, but benefit from a special treatment.

Unemployment

Insurance against a temporary loss of income due to unemployment is also provided by the insurance-based subsystem.⁶ Claimants must meet the following requirements: 540 days of earnings in the 24 months prior to unemployment; registration at an employment office; unemployment must be involuntary; the person must be capable of, and available for, work.⁷

Benefits are earnings-related (65% of average earnings during the 12 months preceding the 2 months before unemployment) and are not subject to taxation. There is both a minimum and a maximum benefit (equal to the minimum wage, in the former case, and three times the minimum wage, in the latter case). The duration of payment is calculated according to the age of the insured person. For individuals up to 30 years of age, the duration is 12 months; for those aged between 31 and 40, 18 months; for those aged between 41 and 45, 24 months; and for those aged

⁶ Unemployment assistance is provided to protect unemployed persons when they are not eligible for insurance benefits or have exhausted their entitlement thereto. This unemployment assistance is means-tested and paid at a flat rate.

⁷ Payment is suspended if beneficiaries do not fulfill their duties (for example, looking for a job or participating in training programs).

over 45, 30 months plus 2 months for each 5-year period of contributions paid during the last 20 years.⁸

Since 1991, there has been a pre-retirement benefit, paid with the aim of encouraging older workers to free up jobs. This measure was clearly inspired by labor market considerations and has been applied to the long-term unemployed under the following conditions: i) from the age of 60, for those who had completed 20 years of insurance and were aged 50 or more on the date when the benefit was claimed; and ii) from the age of 55, for those who, having 20 years of insurance, were aged 50 or more at the beginning of their period of unemployment. In the second case, the pension is reduced and is paid until the age of 60, when the unemployment benefit is converted into the old-age pension.

3. Data, definitions and methodological issues

The empirical data source used in this paper is the longitudinal survey of EUROSTAT, ECHP – European Community Household Panel – covering the eight waves corresponding to the 1994-2001 period, which is representative of the whole Portuguese population. This database contains systematic information about the household income and the socio-demographic and socio-professional characterization of individuals, such as their labor market status, health, education, housing conditions and a broad set of information on the social indicators of the standards of living of households and persons.

⁸ Since 2006, the duration of such payments has been variable, depending on the insured person's age and employment record.

The observation unit considered throughout the paper is the individual. However, the household remains the unit of measurement for some variables, such as the variable of resources (income), or is used to characterize the environment in which the individual lives.

Starting from the original data, some methodological issues have to be dealt with and certain choices have to be made about the definitions of variables, as these have a direct impact on the analysis that is carried out.

The first issue to be addressed, as it is probably the most important one for this paper, is the definition of a retired individual. There are different ways of defining the “retired” state of a person from micro data, each one with its own particular advantages and drawbacks. The various definitions depend on how the reality is investigated and which criterion is adopted for configuring the concept, whether it is *objective* or *subjective* in nature. In the case of an objective criterion, we can classify an individual as being retired if, for instance, his/her main source of income is a pension paid by the social security system or if he/she has completely withdrawn from the labor market. In subjective terms, we classify an individual as being retired in accordance with each individual’s own assessment of his or her labor market status. We are aware that any one of these possibilities would lead to differentiated ways of identifying the target population of the study, and therefore to potentially different findings. In this paper, we give greater emphasis to the subjective approach.

In addition to the discussion of the definition of retirement, one can also include the issue of “early retirement”. We adopt the simple approach of considering as “early retired” individuals all those classified as retired when still below the legal age of retirement. This simple approach has, however, one major drawback, relating to the existence of different regimes of early retirement,

especially among civil servants. In order to circumvent this issue, we do not consider civil servants in our analysis.

Another issue to be considered is the timing of the transition. Many authors consider the individual's transition to retirement to be a *process* (in the sense that the transition takes some time to be prepared by individuals and passes through a period in which the number of working hours are gradually reduced, so that it cannot generally be pinned down to just one point in time). However, we adopt here a more “workable” definition of retirement, based on what each adult respondent declares at a given point in time regarding his/her labor market status. The transition is considered to take place in the first year that the individual declares the changed situation in regard to his/her labor market status.

In an attempt to overcome some of the drawbacks of the options discussed above, we consider three alternative definitions of early retirement:

- i) a more restrictive one, in which we consider as early retired only those individuals who classify themselves as retired, are below the legal retirement age⁹ and do not receive any sickness/invalidity benefits (**Type 1**);
- ii) a second one, in which we add to this group those individuals who are classified as long-term unemployed (**Type 2**)¹⁰;

⁹ In our sample, the legal retirement age for male workers was 65 years and for female workers had gradually changed from 62 years in 1994 to 65 years since 1999.

¹⁰ We consider as long-term unemployed those individuals who have been unemployed for at least 12 months.

iii) a third one, in which we add those individuals who are neither working nor unemployed, but who have health problems that impede the exercise of their regular daily activities (**Type 3**).

The second and third definitions are designed to take into account the existence of the different pathways to retirement that are followed by individuals. Despite being formally different, these pathways are, however, related to the same economic behavior: an exit from the labor market in the later stages of working life. In particular, we manage to identify two alternative pathways out of the labor market: one in which workers experience unemployment before entering retirement and another one in which workers experience some spell of sickness leave, after which they do not go back to work. We use these different definitions throughout the paper in our attempts to evaluate patterns of early retirement and the determinants of early retirement.

Some other questions were also considered in the definition of the data to be used in the analysis. Since we are interested in the transition, we only consider as experiencing the transition those individuals for whom this actual change of status is observed. Furthermore, since we are only interested in those exits into retirement that take place in the later stages of an individual's working life, we only consider individuals for whom the transition is observed after they have reached 50 years of age.

Taking all of these factors into account, we considered in our analysis two groups of individuals aged over 50 who were not civil servants: i) individuals experiencing the transition to early retirement; and ii) individuals who did not change their labor market status, used as the control group. Using the **type 1** definition of early retirement, 3460 individuals were observed (147 early retired and 3313 who did not change their status); when the **type 2** definition was used we had

3466 observations (156 early retired and 3310 who did not change their status); and 3664 when the **type 3** definition was taken into account (354 early retired and 3310 who did not change their status).

4. Hazard Rates

We calculated hazard rates for the three definitions of retirement, correcting for right-censored observations. Nevertheless, we do not present the charts here because of space limitations. Instead, the Wilcoxon (Gehan) Statistic, which compares subgroups defined according to a control variable, is displayed in Tables 1 to 7. The significance of the statistic shows the importance of the control variable.

Our results indicate that hazard rates generally increase with age. The differences in hazard rates between men and women are highly significant when the type 2 and type 3 definitions of retirement are used, with women retiring earlier than men. These differences are not important if individuals are not married. It is when we consider married individuals that we find different behaviors for men and for women, with married women retiring considerably earlier than married men. Generally, married individuals behave differently from unmarried individuals when we consider retirement according to types 2 and 3. Those who are not married tend to retire earlier than those who are married.

With the exclusion of retirement type 1, individuals with children in their households retire earlier. For men, the difference is only statistically different when considering retirement type 3. For women, only type 1 produces non-significant differences.

As far as retirement types 1 and 2 are concerned, differences in health status are not relevant. However, with type 3, which corresponds to a definition of retirement that includes those who declare health problems and may be receiving sickness/invalidity benefits, this difference becomes very significant. Notably, this happens for men as much as for women. Individuals with health problems obviously retire earlier than those with no health problems.

Having a spouse who is working definitely lowers the chances of an individual retiring early. The level of education generally does not matter, and family size is important when not using the stricter definition of early retirement.

5. Determinants of transition to early retirement: the probit model

The analysis carried out so far has enabled us to describe patterns of early retirement for different types of individuals. But, since this is a bivariate analysis, the conclusions have to be considered carefully as compositional effects may be present, and in such cases the marginal effects of each of the characteristics cannot be properly identified.

In this section, we try to identify the determinants of early retirement. In order to analyze which characteristics make some individuals more likely to retire early, we estimate several models of the probability of early retirement.

In this analysis, we consider only the individuals observed with ages between 50 and 64 who have either been classified as early retired or have not changed their labor market status in the sample, and who are not civil servants.

Probabilistic models are estimated considering the three definitions of early retirement that we have been using. We also present separate models for married and unmarried individuals. We exclude all individuals/years for which there is missing information in any of the variables of the models.

We include a broad set of variables that may act as determinants of the decision to take early retirement. The importance of most of these has been argued in the literature, which we discussed in the introduction. In order to avoid the possible contagion of the explanatory variables by the status of the decision variable, the explanatory variables are evaluated for the year before the decision to take retirement.

We consider personal characteristics such as age, gender, health status and education.

To capture the effect that income and wealth may have on the decision, we include personal income, the existence of capital income and home ownership.

We also consider family characteristics such as marital status, whether spouses work, the state of health of the spouse, family size and the existence of children in the family, in order to take into account both household structure and family interactions.

In order to address early retirement as a result of external circumstances (involuntary retirement), we introduce an unemployment variable. We choose the regional unemployment rate since geographical mobility levels in Portugal are low.

Finally, we include other variables in an attempt to account for differences by industrial activity in the year before retirement, and by geographical region of residence.

Some descriptive statistics that compare those who retire early with those who do not are presented in Table 8.

The results of the estimated models are presented in Tables 9 to 11. We find that age, health, the labor market status of the spouse, family size (but not the number of children *per se*), geographical location, and, to some extent, income and home ownership significantly influence the decision to retire early.

Using the first two definitions of early retirement, it can be said that the older the individual, the higher the probability of his/her retiring early. This positive effect of age on early retirement is found in most studies (see Dorn and Souza-Poza 2005a, Schils 2001, Dahl et al 2003, Larsen and Pedersen 2008, for example).

The existence of health problems is always important when married individuals are considered. For the total set of individuals, health is important for explaining the decision to take early retirement when all individuals who are not working and receive sickness/disability benefits are included. Some of the studies that have found that health problems significantly increase the risk of retirement are Schils (2001) for the Netherlands, Jia (2004) for Norway, and Piekkola and Deschryvere (2004) for Belgium, Germany and Finland considered together.

A higher income level discourages the exit from the labor market of individuals who are not married. When using the third definition of early retirement, the effect is generalized to the set of all individuals. A higher income level represents a higher opportunity cost of leaving the labor market. The same effect may be found in Blanco (2000), Schils (2001) and Dahl et al (2003).

The larger the family size of married individuals, the lower the probability of their retiring early, which may express the higher need for labor income, although it may also represent a different behavior on the part of individuals who belong to larger families. Family size is usually not present in studies of the determinants of early retirement, except indirectly, using equivalized income. The only study that we found that included this variable was Blanco (2000), which also showed some evidence of a negative effect.

Home ownership seems to negatively affect the decision to take early retirement, especially when unmarried individuals are deciding. The housing market in Portugal is dominated by homeowners. Renters are in a minority. Homeowners do not necessarily possess other types of wealth, and the house is not normally seen as something that can be sold to compensate for the decrease in income with early retirement. Additionally, home ownership involves other expenses, such as rates, taxes and maintenance, which have to be assured, and most of all it may be an alternative and “to some extent, mutually exclusive mechanism of life-time saving for old age” (Castles and Ferrera 1996) This result contradicts the application to Portugal of the ideas expressed in Doling and Horsewood (2003), namely that the rise in early retirement in Europe may be closely related to rising levels of home ownership.

There is clear evidence of couple coordination in the retirement decision, with those individuals who have a working spouse more likely to stay in the labor market.

There are significant differences between Portuguese regions. Workers in the Algarve are the least likely to retire early, while workers in the Azores seem to be more prone to early retirement. Other regions with a greater tendency to early retirement – using the broader

definition of early retirement – are Madeira and the region around the capital (Lisbon and the Tagus Valley).

Conclusions

This paper analyzes the early retirement decisions of Portuguese workers aged 50 to 64. It investigates the main characteristics of early retirees, and the main determinants of their decision, considering different definitions of early retirement in order to take into account the different pathways to retirement that workers may follow.

We identify a first definition of early retirement as a pure early retirement type; a second definition that also includes the unemployment pathway; and a third definition that adds the disability/sickness exit route.

The paper uses two methodologies to discover who retires early in Portugal: the calculation of hazard rates and a probit estimation.

The variable that is identified as significant, using all the definitions of early retirement and both methodologies, is the activity status of the spouse. This result points to very strong evidence of couple coordination in the retirement decision.

Health problems and family size (especially for married individuals) are clearly identified as important, using both methodologies. The former increases the probability of individuals retiring early, the latter does the opposite.

Geographical location also plays a role. Different regions are associated with different probabilities of early retirement. The Algarve, for instance, is associated with less early retirement, whichever definition is used.

Other determinants of early retirement appear in the analysis, although not so consistently. It is generally easier for an individual who is closer to the legal retirement age, has a lower income or faces higher regional unemployment rates to retire early. People earning more are less likely to retire early, showing that income acts as an incentive to stay in the labor market. Capital income does not seem to make much difference.

There does not seem to be a relationship between the decision to retire early and the level of education or the health status of the spouse.

Home ownership is seen to decrease the probability of unmarried individuals retiring early, or all individuals if we use the type 2 definition of early retirement. Perhaps this is somehow linked to the easier mobility associated with those who are unmarried, unemployed and do not own their own homes.

There is some mixed evidence as to the effects of gender and the existence of children. When one looks at hazard rates, being a female or having children in the household makes individuals more likely to retire early. But, when one looks at the results of the probit model, the effects are not significant. This happens because the probit controls for other effects.

The present socio-economic context has generated some contradictory goals that have to be addressed. Social protection systems face important challenges in terms of their sustainability, namely caused by ageing, but, at the same time, there is a generalized need to increase

productivity – frequently associated with the use of new technologies – and some economies still face high unemployment rates, which create an incentive to replace older workers younger with ones. On the one hand, there are incentives both to postpone the moment of retirement and to make early retirement more difficult. On the other hand, there are incentives to facilitate exits from the labor market.

In Portugal, some early retirement regimes were introduced, firstly in 1991 for the long-term unemployed, and later in 1999 for all workers,. Despite being generous in theory, the conditions under which workers qualify for early retirement, namely the number of contributory years needed, combined with the relative youth of the social security system in Portugal, made these rather scant reforms. More recently, and under a process of social security reform, some changes have been introduced to regimes of early retirement, designed to make this even more difficult.

In this context, understanding which are the real determinants that make some individuals more likely to retire early is a matter of fundamental importance, as it makes it possible to design better protection systems that target those most in need. In spite of some fragilities caused by the short-lived early retirement regime in Portugal, we found quite interesting results, namely the effect of health or the coordinated nature of the retirement decision between couples, which may be taken into account when introducing changes to the social protection system and the rules for early retirement.

References

- Anderson, K. and R. Burkhauser. 1985. "The retirement-health nexus: a new measure of an old puzzle." *The J. of Human Resources* 20 (3): 315-30.
- Bazzoli, G.1985. "The early retirement decision: new empirical evidence on the influence of health." *The J of Human Resources* 20 (2): 214-34.
- Blanco, A.2000. "The decision of early retirement in Spain." Universidad del País Vasco EEE76.
- Blau, D. M.1998. "Labor force dynamics of older married couples." *Journal of Labor Economics* 16 (3): 595-629.
- Blöndal, S. and S. Scarpetta. 1999. "The retirement decision in OECD countries" OECD Economics Department Working Paper No. 202.
- Castles, F. and M. Ferrera. 1996. "Home Ownership and the Welfare State: Is Southern Europe Different?" *South European Society and Politics* 1: 163 -85.
- Coile, C. 2004. "Retirement incentives and couples' retirement decisions." *Topics in Economic Analysis and Policy* 4 (1) Article 17.
- Compton, J. 2001. "Determinants of retirement: does money really matter?" Online working paper <http://dsp-psd.communication.gc.ca/Collection/F21-8-2001-2E.pdf>
- Dahl, S. O. Nilsen and K. Vaage. 2003. "Gender differences in early retirement behaviour." *European Sociological Review* 19 (2): 179-98.
- Doling, J. and N. Horsewood. 2003. "Home ownership and early retirement: European experience in the 1990s." *Journal of Housing and the Built Environment* 18: 289-308.
- Dorn, D. and A. Sousa-Poza. 2005a. "The determinants of early retirement in Switzerland." *Swiss Journal of Economics and Statistics* 141 (2): 247-83.

- Dorn, D. and A. Sousa-Poza. 2005b. "Early retirement: free choice or forced decision?" Cesifo Working Paper No. 1542.
- Euwals, R., D. Van Vuuren and R. Wolthoff. 2006. "Early retirement behaviour in the Netherlands: evidence from a policy reform." IZA Discussion Paper No. 1992
- Fischer, J.A.V. and Souza Poza, A. 2006. "The institutional determinants of early retirement in Europe." University of St. Galle, Department of Economics Discussion Paper No. 08.
- Filer, R. K. and P. A. Petri. 1988. "A job-characteristics theory of retirement" *The Review of Economics and Statistics* 70 (1): 123-28.
- Green, C. 2006. "The unexpected impact of health on the labor supply of the oldest Americans." *Journal of Labor Research* 27 (.3): 361-79.
- Gruber, J and D. Wise (eds.). 1999. Introduction and summary. In "Social security programs and retirement around the world." National Bureau of Economic Research 1-36.
- Gustman, A. and T. Steinmeier. 2000. "Retirement in dual-career families: a structural model." *Journal of Labor Economics* 18 (3): 503-45.
- Gustman, A. and T. Steinmeier. 2002. "Social security, pensions and retirement behavior within the family." National Bureau of Economic Research Working Paper No. 8772.
- Hakola, T. 2000. "Navigating through the Finnish pension system." Government Institute for Economic Research (VATT) Discussion Paper No. 224.
- Hakola, T. and S. Ilmakunnas. 2000. "Early retirement schemes: Incentives and policy issues." Paper presented at "The Year 2000 International Research Conference on Social Security", Finland.

- Hakola, T. and R. Uusitalo. 2002. "Let's make a deal. The impact of the Social Security provisions and firm liabilities on early retirement decisions." Government Institute for Economic Research (VATT) Discussion Paper No.260.
- Hayward, M. 1986. "The influence of occupational characteristics on men's early retirement." *Social Forces* 64 (4): 1032-45.
- Hayward, M. and M. Hardy. 1985. "Early retirement processes among older men: occupational differences." *Research on Aging* 7 (4): 491-515.
- Hernoes, E., M. Sollie and S. Strom. 2000. "Early retirement and economic incentives." *The Scandinavian Journal of Economics* 102 (3): 481-502.
- Hutchens, R. 1999. "Social Security benefits and employer behavior: evaluating Social Security early retirement benefits as a form of unemployment insurance." *International Economic Review* 40 (3): 659-78.
- Hytti, H. 2004. "Early exit from the labour market through the unemployment pathway in Finland." *European Societies* 6 (3): 265-97.
- Jia, Z. 2004. "Spousal influence on early retirement behavior." Statistics Norway Research Department Discussion Paper No.406.
- Jiménez-Martin, S., J. M. Labeaga, and M. Martínez-Granado. 1999. "Health status and retirement decisions for older European couples." Available at SSRN: <http://ssrn.com/abstract=207188>
- Larsen, M. and N. Gupta. 2004. "The impact of health on individual retirement plans: a panel analysis comparing self reported versus diagnostic measures" Aarhus School of Business, Department of Economics Working Paper 04-7.

- Larsen, M. and P.J. Pedersen. 2008. "Pathways to early retirement in Denmark, 1984-2000." *International Journal of Manpower* 29 (5): 384-409.
- Linsenmeier, D. 2002. "Do retiree health benefits cause early retirement?" Princeton University Working Paper 260.
- Mastrogiacomo, M, R. Alessie, and M. Lindeboom. 2002. "Retirement behaviour of Dutch elderly households: diversity in retirement patterns across different household types." Tinbergen Institute Working Paper No. 2002-073/3.
- McGarry, K. 2002. "Health and retirement: do changes in health affect retirement expectations?" National Bureau of Economic Research Working Paper No.9317.
- Miah, M. and V. Wilcox-Gök. 2007. "Do the sick retire early? Chronic illness, asset accumulation and early retirement." *Applied Economics* 39: 1921-36.
- Osberg, L. 1993. "Is it retirement or unemployment? Induced 'retirement' and constrained labour supply among older workers." *Applied Economics* 25: 505-19.
- Pellechio, A. 1979. "Social Security and retirement: evidence from the Canada time series." National Bureau of Economic Research Working Paper No.351.
- Piekkola, H. & M. Deschryvere. 2004. "Retirement decisions and option values: their application regarding Finland, Belgium and Germany." The Research Institute of the Finnish Economy Discussion Paper No 951.
- Quinn, J. 1977. "Microeconomic determinants of early retirement: a cross-sectional view of early retirement: a cross-sectional view of white married men." *The Journal of Human Resources* 12 (3): 329-46.

- Schils, T. 2001. "Transitions to retirement: a dynamic approach to the labour market behaviour of older workers in the Netherlands." Paper prepared for the 15th Annual Conference of the European Society for Population Economics, June 14-16.
- Sickles, R. and P. Taubman. 1986. "An analysis of the health and retirement status of the elderly." *Econometrica* 54 (6): 1339-65.

Table 1

Wilcoxon (Gehan) Statistic:

Comparisons for control variable **Female**

Wilcoxon (Gehan)			Sig.
Statistic			
Type1		.445	.505
Type2		11.003	.001
Type3		24.205	.000
Type1	Not married	1.266	.261
	Married	.009	.925
Type2	Not married	.024	.877
	Married	9.615	.002
Type3	Not married	.024	.877
	Married	26.935	.000

Table 2

Wilcoxon (Gehan) Statistic:

Comparisons for control variable **Married**

Wilcoxon (Gehan)		
	Statistic	Sig.
Type1	.443	.506
Type2	7.500	.006
Type3	3.571	.059

Table 3

Wilcoxon (Gehan) Statistic:

Comparisons for control variable **Family Size**

Wilcoxon (Gehan)		
	Statistic	Sig.
Type1	5.576	0.781
Type2	21.356	0.011
Type3	24.343	0.004

Table 4

Wilcoxon (Gehan) Statistic:

Comparisons for control variable **Child**

		Wilcoxon (Gehan) Statistic	Sig.
Type1		.433	.511
Type2		6.313	.012
Type3		10.732	.001
Type1	Not married	1.185	.276
	Married	1.462	.227
Type2	Not married	7.987	.005
	Married	1.682	.195
Type3	Not married	5.663	.017
	Married	6.062	.014
Type1	Men	.504	.478
	Women	.008	.929
Type2	Men	1.750	.186
	Women	5.644	.018
Type3	Men	5.293	.021
	Women	5.915	.015

Table 5

Wilcoxon (Gehan) Statistic:

Comparisons for control variable **Health**

Wilcoxon (Gehan)			
		Statistic	Sig.
Type1		.095	.758
Type2		1.149	.284
Type3		74.546	.000
Type1	Men	.082	.775
	Women	.038	.846
Type2	Men	.006	.936
	Women	1.517	.218
Type3	Men	33.215	.000
	Women	34.903	.000

Table 6

Wilcoxon (Gehan) Statistic:

Comparisons for control variable **Spouse working**

		Wilcoxon (Gehan)	
		Statistic	Sig.
Type1		5.577	.018
Type2		65.927	.000
Type3		45.011	.000
Type1	Men	1.000	.317
	Women	6.028	.014
Type2	Men	34.212	.000
	Women	34.535	.000
Type3	Men	19.378	.000
	Women	30.179	.000

Table 7

Wilcoxon (Gehan) Statistic:

Comparisons for control variable **Education**

		Wilcoxon	
		(Gehan) Statistic	Sig.
Primary and lower secondary education	Type1	0.014	0.906
	Type2	2.518	0.113
	Type3	0.001	0.970
Upper secondary education	Type1	1.361	0.243
	Type2	5.535	0.019
	Type3	1.089	0.297
Post-secondary education	Type1	0.466	0.495
	Type2	0.073	0.787
	Type3	1.072	0.300

TABLE 8

Descriptive statistics of early retired and non early retired

	Type 1		Type 2		Type 3	
	Non early retired	Early retired	Non early retired	Early retired	Non early retired	Early retired
<i>Proportion of individuals</i>						
Female	0.397	0.374	0.398	0.365	0.398	0.424
With health problems	0.050	0.088	0.050	0.083	0.050	0.158
Married	0.878	0.816	0.878	0.808	0.878	0.833
With children	0.150	0.088	0.150	0.083	0.150	0.107
Home owners	0.861	0.816	0.861	0.788	0.861	0.833
Spouse with health problems	0.079	0.082	0.079	0.071	0.079	0.099
Spouse working	0.448	0.286	0.448	0.276	0.448	0.345
With capital income	0.048	0.068	0.048	0.071	0.048	0.048
Primary and lower secondary education	0.961	0.973	0.961	0.968	0.961	0.977
Upper secondary education	0.021	0.000	0.021	0.006	0.021	0.011
Post-secondary education	0.018	0.027	0.018	0.026	0.018	0.011
Average age	55.688	57.102	55.687	57.038	55.687	56.099
Average size of family	3.343	2.830	3.343	2.788	3.343	3.042

Table 9

PROBIT model of the probability of early retirement – **type 1**

Variable	All individuals <i>Marginal effect</i>	Married <i>Marginal effect</i>	Not married <i>Marginal effect</i>
<i>Personal characteristics</i>			
Age	0.0020 *	0.0017 *	0.0002 *
Female	0.0003	-0.0001	0.0008
Health	0.0187	0.0281 *	(dropped)
Married	-0.0011		
Home owner	-0.0121	-0.0070	-0.0046 *
Secondary education	(dropped)	(dropped)	(dropped)
Tertiary education	0.0275	0.0252	(dropped)
<i>Family characteristics</i>			
Size	-0.0087 *	-0.0111 *	-0.0002
Children	-0.0013	-0.0003	-0.0001
Spouse with health problems	-0.0003	-0.0061	(dropped)
Spouse working	-0.0177 *	-0.0184 *	0.9995 *
<i>Income</i>			
Income	-0.0000	-0.0000	-0.0000 *
With capital income	0.0057	0.0077	(dropped)

Variable	All individuals	Married	Not married
	<i>Marginal effect</i>	<i>Marginal effect</i>	<i>Marginal effect</i>
<i>Regional unemployment</i>	0.0010	0.0011	0.0001
<i>Region dummies</i>	Yes *	Yes *	Yes *
<i>Industry dummies</i>	Yes	Yes	Yes *
No. of Obs.	3389	2974	275
LR chi2	109.87	99.59	50.87
Pseudo R2	0.091	0.099	0.304
* - significant at 5% level; ** significant at 10% level			
<i>Note:</i> The reference individual used for the estimation of all individuals is a male individual, without health problems, single, with primary education, who does not own his own home, living in the North Region and working in agriculture, without children and with no capital income.			

Table 10

PROBIT model of the probability of early retirement – **type 2**

Variable	All individuals <i>Marginal effect</i>	Married <i>Marginal effect</i>	Not married <i>Marginal effect</i>
<i>Personal characteristics</i>			
Age	0.0020 *	0.0018 *	0.0030
Female	-0.006	0.0002	-0.0187
Health	0.0148	0.0227 **	(dropped)
Married	-0.0034		
Home owner	-0.0179 *	-0.0108	-0.0892 *
Secondary education	-0.0224	-0.0098	(dropped)
Tertiary education	0.0324	0.0299	(dropped)
<i>Family characteristics</i>			
Size	-0.0086	-0.0117 *	0.0005
Children	-0.0017	0.0011	-0.0194
Spouse with health problems	-0.0053	-0.0100	(dropped)
Spouse working	-0.0171 *	-0.0169 *	0.6107 *
<i>Income</i>			
Income	-0.0000	-0.0000	-0.0000 *
With capital income	0.0112	0.0136	(dropped)

Variable	All individuals	Married	Not married
	<i>Marginal effect</i>	<i>Marginal effect</i>	<i>Marginal effect</i>
<i>Regional unemployment</i>	0.0013	0.0012	-0.0025
<i>Region dummies</i>	Yes *	Yes *	Yes *
<i>Industry dummies</i>	Yes	Yes	Yes *
No. of Obs.	3466	3033	277
LR chi2	129.84	122.59	41.60
Pseudo R2	0.102	0.117	0.229
* - significant at 5% level; ** - significant at 10% level			
<i>Note:</i> The reference individual used for the estimation of all individuals is a male individual, without health problems, single, with primary education, who does not own his own home, living in the North Region and working in agriculture, without children and with no capital income.			

Table 11

PROBIT model of the probability of early retirement – **type 3**

Variable	All individuals <i>Marginal effect</i>	Married <i>Marginal effect</i>	Not married <i>Marginal effect</i>
<i>Personal characteristics</i>			
Age	0.0003	0.0003	0.0023
Female	-0.0012	0.0057	0.0301
Health	0.1508 *	0.1455 *	0.0724
Married	-0.0027		
Home owner	-0.0193	-0.0038	-0.0637 **
Secondary education	-0.0234	-0.0094	-0.0210
Tertiary education	0.0243	0.0284	(dropped)
<i>Family characteristics</i>			
Size	-0.0092 *	-0.0135 *	0.0126
Children	-0.0025	0.0090	-0.0494
Spouse with health problems	-0.0011	-0.0038	0.5731 *
Spouse working	-0.0313 *	-0.0359 *	0.0125
<i>Income</i>			
Income	-0.0000 *	-0.0000 *	-0.0000 *
With capital income	-0.0019	0.0043	(dropped)

Variable	All individuals	Married	Not married
	<i>Marginal effect</i>	<i>Marginal effect</i>	<i>Marginal effect</i>
<i>Regional unemployment</i>	0.0060 **	0.0077 *	-0.0078
<i>Region dummies</i>	Yes *	Yes *	Yes *
<i>Industry dummies</i>	Yes *	Yes *	Yes *
No. of Obs.	3664	3202	450
LR chi2	160.71	145.53	72.73
Pseudo R2	0.069	0.074	0.208
* - significant at 5% level; ** - significant at 10% level			
<i>Note:</i> The reference individual used for the estimation of all individuals is a male individual, without health problems, single, with primary education, who does not own his own home, living in the North Region and working in agriculture, without children and with no capital income.			